Vegetation Resources Inventory

Guidelines for Preparing a Project Implementation Plan for Photo Interpretation

Prepared by
Ministry of Sustainable Resource Management
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for the
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Abstract

The Ministry of Sustainable Resource Management (MSRM) Resource Information Branch has developed a business planning process to ensure the successful implementation of the Vegetation Resources Inventory (VRI) ground sampling and photo interpretation projects. This process includes the preparation of VRI Strategic Inventory Plans (VSIPs) and Project Implementation Plans (VPIPs).

This document provides guidance to stakeholders responsible for preparing the VPIP for photo interpretation projects. Guidelines for preparing the VPIP for ground sampling are presented in a separate report.

The photo interpretation VPIP is a working document that details the specific operational activities associated with the implementation and documentation of the inventory project. It identifies the target areas for new photo interpretation, data sources, availability of aerial photographs, format of base files, project scheduling, etc.

The intent is that these guidelines will expedite the MSRM/MoF VPIP standards and business review process, while also providing documentation that will provide consultants with a basis to develop competitive contract submissions. Development of this document is a fundable activity under the current FIA investment guidelines and is a component of the MSRM VRI inventory standard.

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The Resources Information Standards Committee evolved from the Resources Inventory Committee which received funding from the Canada-British Columbia Partnership Agreement of Forest Resource Development (FRDA II), the Corporate Resource Inventory Initiative (CRII) and by Forest Renewal BC (FRBC), and addressed concerns of the 1991 Forest Resources Commission.

For further information about the Resources Information Standards Committee, please access the RISC website at: http://srmwww.gov.bc.ca/risc/.

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Introduction

The Ministry of Sustainable Resource Management (MSRM) Resource Information Branch has developed a business planning process to ensure the successful implementation of the Vegetation Resources Inventory (VRI) ground sampling and photo interpretation projects. This process includes development of VRI Strategic Inventory Plans (VSIPs) and Project Implementation Plans (VPIPs). This report provides guidelines that can be used to prepare a VPIP for the photo interpretation projects. Guidelines for the preparation of VPIPs for ground sampling are available in a separate report.

The intent is that these guidelines will expedite the MSRM/MoF VPIP standards and business review process while ensuring successful product delivery.

Included in this document is a description of the VRI business planning process and an outline of the VPIP document preparation guidelines. A glossary of terms is provided in Appendix A.

VRI Planning

The MSRM has developed a VRI business planning process to ensure the successful completion of a VRI inventory. This VRI planning process involves developing VSIPs and VPIPs that identify resource-specific management issues, desired inventory products and activities, and priorities (Figure 1). A VSIP broadly outlines the VRI activities and products needed to address the identified forest management issues.

The photo interpretation VPIP is a working document that details the specific operational activities associated with the implementation and documentation of the inventory project. It identifies the target areas for new photo interpretation, data sources, availability of aerial photographs, format of base files, project scheduling, etc.

The development of VSIPs and VPIPs are lead by industrial stakeholders. These planning exercises are a minimum, fundable standard required under Forest Investment Account (FIA) funding rules. Both VRI ground sample and photo interpretation inventories must be approved by MSRM to ensure the project is completed to current standards, and by the MoF to ensure the project meets their business needs.

MSRM VRI inventory staff is available to assist in the development of these plans.

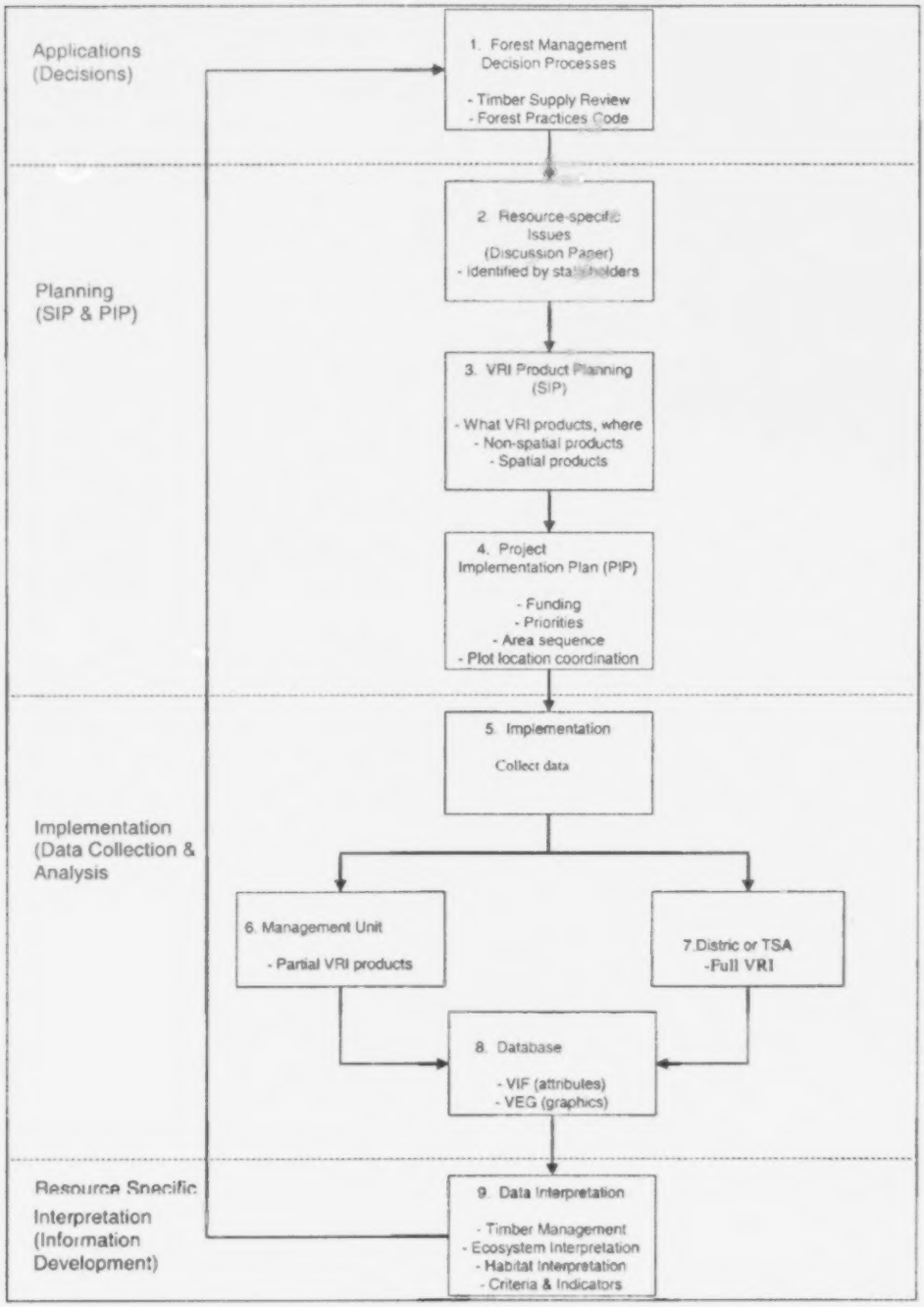

Figure 1 - Suggested Vegetation Resources Inventory Planning Process

Project Implementation Plan Guidelines

The following sections provide an outline and guidelines for preparing a Project Implementation Plan (VPIP) for photo interpretation for management unit inventories.

Introduction

Background Information

Briefly describe:

- The VRI process.
- The state of the current inventory (quality, age, etc.).
- The information needs (Timber Supply Review, habitat mapping, etc.).

How the photo interpretation fulfills the information requirements.

Document Objectives

Describe the objectives of the VPIP document.

Landbase

Describe the land base in terms of geographic area, forest types, and administrative zones. Include map and summary area statistics.

Note that all portions of project maps within a Timber Supply Area (TSA) or other management unit must be completed to VRI standards. This can be accomplished by either completing new photo interpretation for the entire project map sheet or cutting in previously existing attribute data with subsequent rationalization of the existing polygon line work. No holes, gaps or blank spaces shall exist in the data for the contiguous portion of the TSA or management unit on any map sheet completed as part of a VRI photo interpretation project.

Photo Interpretation Plan

Project Objectives

Define the objectives of the photo interpretation project. Refer to the VRI planning documents: *VRI Strategic Inventory Plans (VSIPs) or other relevant reports (MoF AAC Rationales, LRMPs, Inventory Audits).* These documents outline forest management issues and inventory product needs identified by stakeholders in the management unit. If these planning documents are not available, then a needs analysis must be undertaken. A needs analysis may also be necessary to confirm or refine the objectives in a VSIP. Guidelines for conducting a needs analysis are given in Appendix B.

Target Area

Define the target area for the proposed photo interpretation in terms of mapsheets, stand types, or geographic locations. All portions of project maps within a Timber Supply Area (TSA) or other management unit must be completed to VRI standards. This can be accomplished by either completing new photo interpretation for the entire project map sheet or cutting in previously existing attribute data with subsequent rationalization of the existing polygon line work. No holes, gaps or blank spaces shall exist in the data for the contiguous portion of the TSA or management unit on any map sheet completed as part of a VRI photo interpretation project.

Calibration Data Sources

Data sources are used as calibration points for improving the quality of photo interpretation. An analysis should be undertaken that summarizes the status of the data sources, including all types of ground measurements and air observations. The analysis should be focused on the kind, frequency, distribution, age, completeness, and condition of the available data. Detailed guidelines for this analysis are given in Appendix C.

The analysis should also recommend the number and distribution of additional (new) air calls, ground calls or observations that are needed in the project area.

Inventory Documentation and Archive

Document the history of the existing inventory, digitizing history, quality, and availability of aerial photographs (document and new), format of base maps (NAD 27 or TRIM), kinds of overlays, and data sources. This information is useful to potential contractors who will bid on the project. Detailed guidelines for this documentation are outlined in Appendix D.

Project Implementation

Scheduling

Outline in detail the activities and roles and responsibilities needed to implement the project. Suggested guidelines are available in Appendix E.

Photo Scale

For traditional photo interpretation using hard copy photographs, the minimum acceptable photo scale is 1:15,000 colour or black & white.

For projects utilizing digital softcopy photogrammetric technology, the minimum acceptable scale of the imagery shall be 1:20,000 for coastal areas; 1:30,000 for southern interior and central interior areas; and 1:40,000 for portions of the far northern interior.

The year(s) of photograph acquisition for the project area must be included and approved as part of the Plan. As a guideline, the maximum age of the photographs is five years from the date of the start of attribute estimation. Acceptance of older photographs to fill in information gaps must be reviewed in consultation with the MSRM.

Project Coordinator

The project coordinator and their responsibilities should be identified in the plan. Responsibilities usually involve: coordinating the project; monitoring and communicating project progress; ensuring all contractors are qualified and certified; overseeing photo-interpretation activities; ensuring quality assurance is complete and assisting in coordinating technical expertise where required.

Quality Assurance

Indicate who will conduct quality assurance (polygon delineation and estimation, fieldwork, and digitized attribute and graphic data), when, and by what minimum standard.

Approval/Sign-off of VPIP

The VPIP must be reviewed by MSRM to ensure all appropriate standards are being followed, and the MoF to ensure the scope of the project will meet their business needs. Suggested sign-off contacts are:

I have read and agree that the procedures outlined in this proposal meet current MSRM minimum standards.

_____

Manager, Vegetation Resources Inventory
Resource Information Branch
Ministry of Sustainable Resource Management

I have read and agree that the activities and products outlined in this proposal will meet MOF business needs.

_____

Manager, Development and Policy
Forest Analysis Branch, Ministry of Forests
or other suitable MoF representative

APPENDIX A: GLOSSARY OF TERMS

GLOSSARY OF TERMS

Ground Sampling — Ground sampling is the field measurement of timber, ecology, range and/or coarse woody debris values at one or more locations within each sample polygon. The sample polygons are selected proportional to their area from a sorted list. To accommodate the wide variety of resources, various types and sizes of sampling units (e.g., fixed and variable plots, transects) are used to make the measurements.

Inventory Unit — An inventory unit is the target population from which the samples are chosen. For management inventories, the inventory unit is usually a TSA or TFL.

Land Cover Classification — The BC Land Cover Classification Scheme (BCLCCS) was designed specifically to meet the requirements of the VRI, in addition to providing general information useful for "global vegetation accounting" and "integrated resource management." The BCLCCS is hierarchical and reflects the current state of the land cover (such as the presence or absence of vegetation, type and density of vegetation) and such fixed characteristics as landscape position (wetland, upland, alpine). There are two main classes of polygons: vegetated and non-vegetated.

Photo Interpretation — Photo interpretation involves the subjective delineation of polygons and the photo estimation of attributes for all polygons in an inventory unit. Medium scale aerial photographs (1:15,000) are most often used in the photo interpretation process. However, if the existing photo-based inventory is acceptable, the database can be translated into VRI format and upgraded to include the additional VRI attributes.

Sub-unit — A component of an inventory unit. For example, operable or inoperable land areas are sub-units within a TSA (or TFL), which is the inventory unit.

Population — A collection of sampling elements (or sampling units) that have a common definition and are used in selecting a sample.

Stratum

A component of an inventory unit or sub-unit with defined characteristics that is common to a group of elements or units in the population. Strata are created to improve sampling efficiency by allocating samples where they are needed, according to predetermined priorities. For example, strata can be created on the basis of tree species composition (such as leading species).

Vegetation Resources Inventory (VRI)

The VRI is the MSRM standard for assessing the quantity and quality of BC's vegetation resources. The VRI process is designed to include a flexible set of sampling procedures for collecting vegetation resource information. The VRI is essentially a toolbox of procedures, which include:

Photo Interpretation: the delineation of polygons from aerial photography and the estimation of resource attributes.

Ground Sampling: the establishment of plot clusters in selected polygons to measure timber, ecological, and/or range attributes.

NVAF Sampling: Stem analysis sampling of individual trees for net volume adjustment.

WPV Sampling: Intensive sampling of selected polygons to determine the error between the estimated attribute values and the "true" attribute values.

Statistical Adjustment: the adjustment of the photo interpreted estimates for all polygons in an inventory unit or management unit using the values measured during ground sampling.

The VRI can be deployed over a management unit measuring selected resources in specific portions of the land base. The VRI sampling process produces spatial and non-spatial databases that can be used in multiple resource management applications, including timber, ecosystem and wildlife habitat management.

Within Polygon Variation (WPV) Sampling

WPV sampling provides information for expressing the true individual polygon error, assessed as the difference between the adjusted polygon value and the "true" value for that polygon. The "true" value for the polygon is an estimate derived from a small sample of intensively ground sampled polygons.

APPENDIX B: NEEDS ANALYSIS

A needs analysis is not needed if a VSIP has already concluded that new photo interpretation is required. However, a needs analysis may be necessary, in some cases, to confirm or refine the photo interpretation objectives identified in a VSIP. Identifying what needs to be improved (attributes or delineation), where, and how, involves the following three steps:

- **Identify the needs.** Identify and consult stakeholders to define forest management issues and inventory product needs. The stakeholders may include local planning groups and the users of the inventory. Review recent Timber Supply Review reports and other related documentation.

- **Identifying priority areas within the target area.** Develop and apply criteria for ranking areas based on the management needs.

- **Reviewing the existing inventory.** This involves quantitative evaluation of the attributes and the delineation, an assessment of calibration data sources, and a review of existing photos, maps, and technology.

Quantitative Evaluation

Evaluate the existing photo estimates and delineation. This assessment involves consideration of many factors, including:

- Number and age of unit surveys on which the current inventory is based (classification standards can vary significantly between surveys).
- Quality of the document photos used for photo interpretation.
- Stand complexity, in terms of stand structure and the average number of species per type (how difficult is the photo interpretation?).
- Frequency and distribution of data sources.
- Ratio of immature to mature stands.
- Frequency of stands with a high probability for structural or successional change between inventories.
- Current and future data needs for forest management – will the descriptive data now in the database meet management needs?
- Priority strata, attributes, and geographic areas identified for special attention by resource users.
- Kind and frequency of disturbances since the last re-inventory.
- Quality of the classification of non-forest attributes such as ESAs.

The assessment should be extensive and comprehensive enough to determine:

- Whether the current classification standards for stratification and type descriptions are being met for each unit survey, forest cover stratum, and descriptive attribute.
- The short and long-term requirements for improving the inventory.

Assessment of Stand Attributes

Assess the accuracy of stand attributes using the inventory audit data or similar study information. If an inventory audit has been completed for the project area, briefly summarize and discuss the results of the audit.

The conclusions of the assessment should state:

- What improvements are necessary.
- What and how much work is needed to make those improvements.
- Where to distribute the work.

Also, check the consistency of the old estimates, to identify the potential statistical benefits of completing new photo estimates. (New estimates may not be any better than the old estimates for the purpose of statistical adjustment.) To check the consistency of the old estimates, new estimates should be derived for the sample polygons in which the sample clusters fall. Regression relationships between the old and new estimates and the ground measurements would then be compared. This process should be done using one photo interpreter to provide consistency among estimates. Existing polygon boundaries would be maintained.

Stand Delineation

Assess if current stand delineation meets the new criteria and standards. This assessment could result in the recommendation of (with reasons) one or more of the following options for a given area: no action, an update, or new delineation.

APPENDIX C: CALIBRATION DATA SOURCES

Existing Data Sources

Summarize all data sources for the project area by Age Class, Inventory Type Group, and Data Source Code. Check the data sources of each polygon to indicate what proportion of these are still of value.

Cruise Plot Data Sources

Cruise plot data from unlogged timber sales can be used as calibration points. Determine the number of unlogged cutblocks and the potential number of current and valid cruise plots available to be summarized and transferred to the new photos. Check the availability, suitability, condition, and compatibility of cruise plot data for use in calibration. Also, note how accurately the cruise plots are mapped because this will influence how well they can be transferred to the new photos.

Other Resource Data Sources

There are several types of non-timber surveys that can be used for improving forest classification or other resource overlays. These surveys are not to be confused with the resource overlay information identified in the section on digitizing history. Surveys that may be available can be identified during the client interviews.

Review the availability and suitability of non-timber surveys that could be incorporated into an inventory update or reinventory. This resource information may include wildlife habitat, recreation, watersheds, fisheries, soil sensitivity, and harvesting operability classification. A summary of other resource surveys should include:

- Kind, scope, and number of surveys available.
- Data reliability and compatibility.
- How the data can be incorporated.

APPENDIX D: DOCUMENTATION AND ARCHIVE

Inventory Status

This section describes the history and other relevant details of the current inventory. Summarize the surveys on which the current inventory is based. Information on each unit survey conducted should include the year and the kind of survey (e.g., reinventory, update, ESA, EPA).

A reference map may be prepared to show:

- boundaries of previous inventories on which the current inventory is based (include project names and corresponding reference year).
- boundaries of ESA/EPA surveys and reference year(s).

Summarize the potential classification inconsistencies originating from the previous inventories.

Digitizing History

For each unit survey, list the year of digitizing and the method used for entering forest cover details [detailed forest cover attribute lists (FS 810) or generalized direct label entry].

Aerial Photographs

Summarize the photo specifications and characteristics that could affect the quality of photo interpretation for the document photos by unit survey, and for new photography, if it is available.

Photo Coverage

A complete list of document photos and new photography should be provided. A photo key map highlighting the photos available will also be useful.

Photo Specifications and Quality

Vital information on document and new aerial photographs includes year of photography, scale, photo colour, direction flown, quality of photos, and identification of missing photos. This information should be presented for both the document and new photos.

Base Maps

Review and summarize the status of the base maps and plotting needs. The overriding fact regarding base maps is whether the maps are available in BCGS (NAD 27) or TRIM (NAD 83) format. Other important considerations for each base map are discussed below:

- Show the latest year the base maps were updated for ownership and cadastre, planimetry, and forest cover.

- Identify any maps in the project area that are being modified or updated on another contract, including mapsheets which are adjacent to the project area and mapsheets that border other Forest Regions or Districts. List the maps and highlight them on a map index key map.
- Identify TRIM maps available for an inventory update or reinventory

Information and data that may contribute to the inventory will come from a wide variety of sources and may have been prepared over a long period of time. Special consideration may need to be given to the following aspects of source preparation, digitizing, and plotting:

- Are there planimetric changes, i.e., rivers, roads, or glaciers to plot?
- Considering the age of new classification photography, the rate of disturbance and year of update for planimetry, is a satellite update required?

Special Studies or Surveys

The client interviews may reveal information about special studies such as old history records, fish and wildlife studies, soil sensitivity studies, and terrain mapping projects, which may be useful if they are available.

APPENDIX E: PROJECT SCHEDULE GUIDELINES

The following project guidelines have been taken from the 1997 MoF report: Photo-interpretation (Phase 1) Project Management Guidelines, and are presented for general guidance. Industrial stakeholders should evaluate this list within the context of current FIA, Price Waterhouse Coopers funding and contract administration guidelines.

Preparation

1. Select administrative or management unit (September/October):
    - Public Sustained Yield Unit (PSYU), Forest District, Tree Farm License (TFL), Park
2. Conduct preliminary review (October to January):
    - Evaluate inventory, audits, strategic planning issues, management/government action issues
    - Make new field forms available, if revised
    - Arrange for Terrain Resource Information Management (TRIM) bases
    - Ensure that photos are available
    - Obtain updated overlays
3. Define project area (January):
    - Determine objectives
    - Determine limits of project area
    - Finalize project priorities
    - Conduct stakeholder review

Work Plan

1. Identify activities needed to meet project objectives (January/February)
2. Acquire funding

Viewing

1. Identify contract evaluation team (January/February)

2. Develop viewing materials (January/February):

   - Source material:

     Maps (TRIM and traditional forest cover)

     Photos (new and source)

     Global Positioning Satellite (GPS) traverse of roads and Silviculture Opening boundaries

     Silviculture information

   - Request for Proposals (RFPs):

     Identify eligible contractors

     Prepare RFP packages for contractors

3. Prepare for viewing (February)

4. Conduct the viewing for Photo Interpretation contract (end of February)

The Contract

1. Develop and submit bid proposal (February/March)

2. Award the contract (March):

   - Contract evaluation team compiles and evaluates proposals
   - Award the contract for Photo Interpretation

3. Post contract award and contract implementation:

   - Fulfill Workers' Compensation Board (WCB)/safety requirements
   - Data transfer and polygon delineation (March to May)*

     Data source transfer

     Polygon delineation

     Quality control (QC) delineation

4. Conduct field work (May to August)*:

   - Prepare for field work (May)

- Pre-work meeting and site familiarization
- Conduct field work: air calls and ground calls (June to August)
- Internal QC
- QC field work

5. Photo interpretation (September to January)*:

   - Polygon attribute estimation
   - QC photos

6. Digitizing, checkplots, and final quality assurance (QA) (September to April)*:

   - Polygon transfer
   - Data entry
   - Submit check plots
   - QC check plots
   - QA of data and graphics, and acceptance (February to April)

* **Note:** These time frames are totally dependent on the contract area, the number of photos to be used for the contract area, and field accessibility. Flexibility is required in planning when these activities, and consequently the project, are to be completed.